IN THE SPECIFICATION

1. Please insert the following new paragraph after the Title and before the first paragraph on page 1:

-- This application is the U.S. National Phase under 35 U.S.C. § 371 of International Application No. PCT/JP2004/012458, filed August 24, 2004, which in turn claims the benefit of Japanese Application Nos. 2003-299581, filed August 25, 2003; 2003-306621, filed August 29, 2003; 2003-350058, filed October 8, 2003; 2003-415579, filed December 12, 2003; and 2004-011550, filed January 20, 2004, the disclosures of which Applications are incorporated by reference herein in their entirety. --

2. Please amend the following paragraph starting on page 2, line 10 as follows:

The fuel gas containing at least hydrogen (hereinafter referred to as "anode gas") undergoes a reaction represented by the (chemical formula 1) (hereinafter referred to as "anode reaction") while the hydrogen ion which has moved through the electrolyte 1 undergoes a reaction represented by the (chemical formula 2) (hereinafter referred to as "cathode reaction") with an oxygen-containing gas (hereinafter referred to as "cathode gas") on catalytic reaction layer 2 to produce water, whereby electricity and heat are generated. On the whole of the fuel cell, hydrogen and oxygen react with each other as represented by the (formula 3) to produce water electricity and heat can be used. The side on which the fuel gas such as hydrogen takes part in the reaction is called anode and is given a sign a in the drawings and the side on which the oxidizing agent gas such as air takes part in the reaction is called cathode and is given a sign c in the drawings. Further, diffusion layers 3a and 3c having both gas permeability and electrical conductivity are disposed in close contact with the outer surface of the catalytic reaction layers 2a and 2c, respectively. The diffusion layer 3a and the catalytic reaction layer 2a form an electrode 4a and the diffusion layer 3c and the catalytic reaction layer 2c form an electrode 4c. The reference numeral 5 indicates an electrode-electrolyte assembly (hereinafter referred to as "MEA") and is formed by the electrode 4 and the electrolyte 1. ~~MEA 5 comprises a~~ A pair of electrically-conductive separators 7a and 7c disposed thereon which mechanically fix MEA 5 and electrically connect adjacent MEAs 5 in serial, and ~~has~~ have gas flow paths 6a and 6c formed on the surfaces ~~surface~~ thereof in contact with MEA 5 for supplying the reactive gas into

the electrodes and carrying the gas produced by the reaction or extra gas away is provided. The electrolyte 1, the pair of catalytic reaction layers 2a and 2c, the pair of diffusion layers 3a and 3c, the pair of electrodes 4a and 4c and the pair of separators 7a and 7c form a basic unit of a fuel cell (hereinafter referred to as "cell"). The separators 7a and 7c have the separator 7c and 7a of the adjacent cell disposed in contact therewith, respectively, on the surface thereof opposite MEA 5. The separators 7a and 7c have a cooling water flow path 8 provided on the side thereof in contact with each other through which cooling water 9 flows. The cooling water 9 moves heat such that the temperature of MEA 5 is adjusted through the separators 7a and 7c. MEA 5 and the separator 7a or 7c are sealed to each other with an MEA gasket 10 and the separators 7a and 7c are sealed to each other with a separator gasket 11.

3. Please amend the following paragraph starting on page 8, line 25 as follows:

The 1st aspect of the present invention is a fuel cell system comprising:

a fuel cell which generates electric power from a fuel gas and an oxidizing agent gas;

a fuel gas supplying means which supplies the said fuel gas into the said fuel cell on the anode side thereof;

an oxidizing agent gas supplying means which supplies the said oxidizing agent gas into the said fuel cell on the cathode side thereof;

a raw material gas supplying means which supplies a gas of raw material of the said fuel gas into the said fuel cell; and

a control means which controls the said fuel gas supplying means, the said oxidizing agent gas supplying means and the said raw material gas ~~supporting~~ supplying means, wherein the said control means controls during the starting of electricity generation of the said fuel cell such that the said raw material gas supplying means purges the said fuel cell at least on the cathode side thereof with the said raw material gas before the said oxidizing agent gas supplying means and the said fuel gas supplying means supply the said fuel gas and the said oxidizing agent gas into the said fuel cell, respectively.

4. Please amend the following paragraph starting on page 24, line 18 as follows:

Fig. 1 depicts the basic configuration of a polymer electrolyte type fuel cell as an example of the fuel cell according to Embodiment 1 of implementation of the present invention. A fuel cell is an apparatus to cause a fuel gas containing at least hydrogen and an oxidizing agent gas containing oxygen such as air to react with each other electrochemically, thereby generating electricity and heat at the same time. As an electrolyte 1 there may be used, e.g., a polymer electrolyte membrane which selectively transports hydrogen ion. On the both surfaces of the electrolyte 1 is disposed a catalytic reaction layer 2 comprising as a main component a carbon powder having a platinum-based metal catalyst supported thereon. Reactions represented by (chemical formula 1) and (chemical formula 2) occur on the catalytic reaction layers 2a and 2c. The fuel gas containing at least hydrogen undergoes reaction represented by (formula 1) (hereinafter referred to as "anode reaction") and the hydrogen ion which has moved through the electrolyte 1 undergoes reaction represented by (formula 2) with the oxidizing agent gas on the catalytic reaction layer 2 (hereinafter referred to as "cathode reaction") to produce water, thereby generating electricity and heat. The side on which the fuel gas such as hydrogen takes part in the reaction is called anode and is given a sign a in the drawings and the side on which the oxidizing agent gas such as air takes part in the reaction is called cathode and is given a sign c in the drawings. Further, diffusion layers 3a and 3c having both gas permeability and electrical conductivity are disposed in close contact with the outer surface of the catalytic reaction layers 2a and 2c, respectively. The diffusion layer 3a and the catalytic reaction layer 2a form an electrode 4a and the diffusion layer 3c and the catalytic reaction layer 2c form an electrode 4c. The membrane-electrode assembly (hereinafter referred to as "MEA") 5 is formed by the electrodes 4a and 4c and the electrolyte 1. ~~MEA 5 comprises 1~~ A pair of electrically-conductive separators 7a and 7c ~~disposed thereon~~ which mechanically fix MEA 5 and electrically connect adjacent MEAs in serial, and ~~has~~ have gas flow paths 6a and 6c formed on the surfaces ~~surface~~ thereof in contact with MEA 5 for supplying the reactive gas into the electrodes and carrying the gas produced by the reaction or extra gas away is provided. The electrolyte 1, the pair of catalytic reaction layers 2a and 2c, the pair of diffusion layers 3a and 3c, the pair of electrodes 4a and 4c and the pair of separators 7a and 7c form a basic fuel cell (hereinafter referred to as "cell"). The separators 7a and 7c have the separator 7c and 7a of the adjacent cell disposed in contact therewith, respectively, on the surface thereof opposite MEA 5. The separators 7a and 7c

have a cooling water flow path 8 provided on the side thereof in contact with each other through which cooling water 9 flows. The cooling water 9 moves heat such that the temperature of MEA 5 is adjusted through the separators 7a and 7c. MEA 5 and the separator 7a or 7c are sealed to each other with an MEA gasket 10 and the separators 7a and 7c are sealed to each other with a separator gasket 11.

5. Please amend the following paragraph starting on page 28, line 7 as follows:
Air as an oxidizing agent gas is introduced from the exterior to the stack on the cathode side thereof through a suction pipe 40 and an oxidizing agent gas pipe 40a connected to the suction pipe 40 via a dispensing valve 56 by a blower 39. The oxidizing agent gas which has not been used in the stack 38 is then discharged out of the fuel cell system through an exhaust gas pipe 42. Since a fuel cell needs water content, the oxidizing agent gas which is to flow into the stack 38 is moistened by a humidifier 41. The fuel gas which has not been used in the stack 38 is then again allowed to flow into the fuel generator 35 through an off-gas pipe 48. The gas from the off-gas pipe 48 is used in combustion or the like and used in an endothermic reaction for the production of fuel gas from raw material gas. The purified gas pipe 36 has a dispensing valve 60 provided thereon and the suction pipe 40, too, has a dispensing valve 56 provided thereon. The dispensing valve 60 and the dispensing valve 56 are connected to a bypass pipe 55. Further, between the bypass pipe 55 and the stack 38 and the dispensing valve 60 of the fuel gas pipe is provided a bypass pipe 61 having an on-off valve 62 provided thereon. The dispensing valve 60 adjusts the amount of raw material gas purified in the gas purifying portion 32 to be sent to the fuel generator 35 and the amount of gas to be sent to the bypass pipe 55 and the dispensing valve 56 can mix the oxidizing agent gas sent by the blower 39 and the purified raw material gas sent through the bypass pipe 55 at an arbitrary ratio and then send it to the stack 38. On the fuel gas pipe 37 is provided an on-off valve 49 which cuts the flow of gas or controls the flow rate of gas in the fuel gas feed path of the stack 38. The off-gas pipe 48 has an on-off valve 54 provided thereon which cuts the flow of gas in the fuel gas discharge path of the stack 38. An on-off valve 57 is provided on the oxidizing agent gas feed path from the humidifier 41 to the stack 38 to cut the flow of gas or control the flow rate of gas in the oxidizing agent gas feed path of the stack 38. An on-off valve 58 is provided on the oxidizing agent gas discharge path from the stack 38 to cut

the flow of gas or control the flow rate of gas in the oxidizing agent gas discharge path of the stack 38. In the fuel gas feed path between the on-off valve 49 and the stack 38 is provide a pressure gauge 59a which measures the pressure in the fuel gas feed pipe and the fuel gas flow path in the stack 38. In the oxidizing agent gas feed path between the on-off valve 57 and the stack 38 is provided a pressure gauge 59b which measures the pressure in the oxidizing agent gas feed pipe and the oxidizing agent gas flow path in the stack 38. The voltage of the fuel cell stack 38 is measured by a voltage measuring portion 52, the electric power of the fuel cell stack 38 is taken out by an electric power circuit portion 43 and the valves provided in various pipes for raw material gas, fuel gas, oxidizing agent gas, off-gas and cooling water, various on-off valves, electric power circuit portions, etc. are controlled by a control portion 44. A pump 45 causes water to flow from a cooling water inlet pipe 46 to water flow path in the fuel cell stack 38 and water which has flown through the fuel cell stack 38 is then carried to the exterior through a cooling water outlet pipe 47. It is arranged that when water flows through the stack 38 of the fuel cell the heated stack 38 is cooled and kept at a constant temperature, and the heat obtained from the stack 38 can be used outside the fuel cell system.

6. Please amend the following paragraph starting on page 32, line 16 as follows:

Though not shown in the present figure, the cooling water inlet pipe 46 ~~45~~ and the cooling water outlet pipe 47 normally have devices connected thereto which accumulate or utilize heat such as hot water dispenser. The heat generated by the stack 38 of the fuel cell can be taken and utilized for the supply of hot water. For the electricity generation in the stack 38, voltage is measured by the voltage measuring portion 52, and when the control portion 44 judges that sufficient electricity generation is being conducted, the electric power circuit portion 43 takes electric power out of the system. The electric power circuit portion 43 converts dc electric power taken out of the stack 38 to ac electric power which is then supplied into electric power line used in houses, etc. through a so-called grid connection.

7. Please amend the following paragraphs starting on page 40, line 24 as follows:

Since when t is 0, c is c_0, c is substituted in the (calculation equation 5) to give (calculation equation 6).

(calculation equation 6)

[[c0]] $\underline{c_0}$ = expX

Therefore, the (calculation equation 6) is substituted in the (calculation equation 5) to give the following (calculation equation 7).

(calculation equation 7)

c = [[c0]] $\underline{c_0}$exp(-ν·t/V)

8. Please amend the following paragraph starting on page 48, line 1 as follows:

At the subsequent "suspension step 3", the on-off valves 49 and 51 are closed to enclose the fuel gas in the stack 38. In the present embodiment, since the fuel gas and the raw material gas are enclosed in the stack 38 by the closure of the on-off valves 49 and 51, no gas incoming and outgoing occurs at the "suspension step 3", where ~~only~~ no convection or the like occurs, making it possible to keep the potential of the electrodes 4a and 4c low. Accordingly, deterioration due to oxidation or dissolution occurs less often, making it possible to maintain desired performance over a longer period of time.

9. Please amend the following paragraph starting on page 66, line 5 as follows:

The fuel cell system according to the fourth embodiment of implementation of the present invention comprises a solid polymer type fuel cell 81 which makes electricity generation from a fuel gas and an oxidizing agent gas, a fuel generator 82 which modifies a raw material gas by adding water to produce a hydrogen-rich fuel gas, a water supplying unit 83 which supplies water into the fuel generator 82, a combustor 84 which combusts an exhaust fuel gas from the fuel cell 81, a blower 85 which supplies air as an oxidizing agent gas into the cathode of the fuel cell 81, a purging air supplying unit 86, a fuel gas feed path through which the fluid delivered from the fuel generator 82 is supplied into the anode of the fuel cell 81, a flow path switching unit 88 which switches the flow of the fluid delivered from the fuel generator 82 to a bypass pipe 87 bypassing the fuel cell to introduce the exhaust fuel gas into a passage to the combustor, an on-off valve 89 on a passage through which the remaining fuel gas from the fuel cell 81 is discharged, a raw material cathode supplying unit 810 which supplies a raw material into the cathode of the fuel cell 81 and a cathode closing unit 811 having an on-off valve which opens

and closes the cathode on the inlet side thereof through which air comes in the fuel cell 81 from the blower 85 and on the outlet side thereof through which air is discharged from the fuel cell ~~1~~ 81. The aforementioned raw material is not limited to natural gas, and any material may be used so far as it is a compound composed of at least carbon and hydrogen exemplified by hydrocarbon such as city gas, methane and propane or alcohol such as methanol and ethanol. However, if a liquid raw material such as alcohol is used, it is preferably used in vaporized gas form.

10. Please amend the following paragraph starting on page 89, line 2 as follows:

Further, the electrically-conductive separator plate 116a and the adjacent electrically-conductive separator plate 116c have a cooling water passage ~~19~~ 119 formed on the surface thereof in contact with each other, which cooling water passage being formed by a groove 119a (depth: 0.5 mm) formed on the electrically-conductive separator plate 116a and a groove 119c (depth: 0.5 mm) formed on the electrically-conductive separator plate 116c.

11. Please amend the following paragraph starting on page 92, line 1 as follows:

In the gas purifying portion 122p of the raw material gas supplying unit 122, materials contained in the raw material gas causing deterioration of performance of fuel cell are removed to purify the raw material gas, and then the purified raw material gas is supplied into the fuel generator 123 through a raw material gas feed pipe 163. Herein, since as the city gas there is used city gas 13A containing methane gas, ethane gas, propane gas and butane gas, impurities such as tertiary butyl mercaptane (TBM), dimethyl sulfide (DMS) and tetrahydrothiophine (THT), which are odorizers, contained in city gas 13A are adsorbed and removed in the gas purifying portion ~~22p~~ 122p.

12. Please amend the following paragraph starting on page 108, line 7 as follows:

When the temperature of the fuel generator 123 [[23]] exceeds 640°C, the modification reaction in the fuel generator 123 (reformer 123e) causes the production of hydrogen gas from the raw material gas and water vapor, and if the interior of the fuel cell 21 is purged with such a hydrogen gas, it is likely that local combustion can occur with hydrogen gas in the interior of the fuel cell 21 as electricity generation begins.

13. Please amend the following paragraph starting on page 130, line 17 as follows:

In this manner, the interior of the fuel cell 121 can be exposed to the moistened raw material gas for the transition period between suspension and electricity generation of the fuel cell 121, making it possible to moisten the electrolyte membrane 111 of the fuel cell 121 [[21]] which has been dried during suspension and storage and prevent local combustion of fuel gas with oxygen gas which possibly entered the interior of the fuel cell 121 during suspension and storage.

14. Please amend the following paragraph starting on page 171, line 4 as follows:

The catalyst layers 2022a, 2022b and gas diffusion layers 2023a, 2023b thus obtained were then bonded to the respective surface of a hydrogen ionically- conductive polymer electrolyte membrane [[21]] 2021 (Nafion 112 membrane, produced by Du Pont Inc. of USA). Then, a membrane-electrode assembly (hereinafter referred to as "MEA") 2027 formed by the polymer electrolyte membrane [[21]] 2021, the anode 2024a comprising the catalyst layer 2022a and the gas diffusion layer 2023a and the cathode 2024b comprising the catalyst layer 2022b and the gas diffusion layer 2023b having the polymer electrolyte membrane [[21]] 2021 interposed therebetween was obtained.

15. Please amend the following paragraph starting on page 175, line 1 as follows:

Firstly, the results of operation test in Experiment Nos. 1, 2 and 6 to 8, which are different in time of Step 3, are set forth in Table [[3]] 4. The internal resistivity in Table 4 indicates the average value of internal resistivity of the various single cell units at the end of Steps 3 and 5. The percent deterioration indicates the average value of drop of voltage of the various single cell units per cycle (Steps 1 to 6) after alternate repetition of starting and suspension.

16. Please amend the following paragraph starting on page 219, line 21 as follows:

~~Further, data structures of the present invention include data base, date format, data table, date list, data type, etc.~~